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PATENT

Attorney Reference Number 6454-68359-01
Application Number 10/823,471

CLAIMS

Please cancel claims 49 and 55-57. Claims 1-47 were previously canceled.

1-47. (Canceled)

48. (Amended) A rotary distributor valve comprising:

a stator housing having a stator housing face, wherein the stator housing face comprises at least three fluid port openings, and a central axis of rotation;

a rotor having a rotor face, wherein the rotor face comprises at least two fluid port openings and a central axis of rotation disposed coaxially with the axis of rotation of the stator housing face; [and]

an intermediate valve element having first and second faces, a central axis of rotation disposed coaxially with the axes of rotation of the stator housing and rotor faces, and a plurality of fluid ports extending between the first and second faces, which fluid ports are aligned with the fluid port openings in one of the stator housing face or the rotor face, wherein the first face of the intermediate valve element faces the rotor face and is in fluidly sealing contact with the rotor face, and the second face of the intermediate valve element faces the stator housing face and is in fluidly sealing contact with the stator housing face; and

loading means operable to exert a sealing force on the rotary valve, which urges the stator housing face and the rotor face towards each other to promote fluidly sealing contact between the rotor and stator housing faces and the first and second faces of the intermediate valve element respectively;

wherein the stator housing face and the rotor face are rotatable relative to each other about their common coaxial axis of rotation;

wherein the rotor additionally comprises at least one fluid passage connecting a first fluid port opening in the rotor face to a second fluid port opening in the rotor face; and

wherein the loading means comprises gas pressure loading means, and the gas pressure loading means is operable to exert distributed variable sealing force around a sealing face of the rotary distributor valve, said distributed variable sealing force being responsive to the distribution of pressure in the fluid port openings in the stator housing face.

49. (Canceled)

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50. (Amended) A rotary distributor valve comprising:

a stator housing having a stator housing face, wherein the stator housing face comprises at least three fluid port openings, and a central axis of rotation;

a rotor having a rotor face, wherein the rotor face comprises at least two fluid port openings and a central axis of rotation disposed coaxially with the axis of rotation of the stator housing face; and

an intermediate valve element having first and second faces, a central axis of rotation disposed coaxially with the axes of rotation of the stator housing and rotor faces, and a plurality of fluid ports extending between the first and second faces, which fluid ports are aligned with the fluid port openings in one of the stator housing face or the rotor face, wherein the first face of the intermediate valve element faces the rotor face and is in fluidly sealing contact with the rotor face, and the second face of the intermediate valve element faces the stator housing face and is in fluidly sealing contact with the stator housing face;

wherein the stator housing face and the rotor face are rotatable relative to each other about their common coaxial axis of rotation;

wherein the rotor additionally comprises at least one fluid passage connecting a first fluid port opening in the rotor face to a second fluid port opening in the rotor face; and

wherein the rotor additionally comprises flow control means to control fluid flow within the at least one fluid passage.

51. (Amended) The rotary distributor valve according to claim 48 wherein the intermediate valve comprises a stator secured to the stator housing face.

52. (Amended) The rotary distributor valve according to claim 48 wherein the intermediate valve element fluid ports are aligned with the fluid port openings in the stator housing face, and the intermediate valve element remains rotationally stationary relative to the stator housing face during relative rotation of the stator housing face and the rotor face.

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53. (Amended) The rotary distributor valve according to claim 48 additionally comprising rotary drive means operable to rotate the rotor face and stator housing face relative to each other.

54. The rotary distributor valve according to claim 53 wherein the rotary drive means is operable to vary the speed of relative rotation between the rotor face and stator housing face.

55-57. (Canceled)

58. The rotary distributor valve according to claim 48 wherein the stator housing face and rotor face comprise metal materials, and the intermediate valve element comprises polymeric or carbon materials.

59. (Amended) The rotary distributor valve according to claim 48 wherein the valve is a rotary pressure swing adsorption distributor valve.

60. The rotary pressure swing adsorption distributor valve according to claim 59 additionally comprising flow control means to control fluid flow within the at least one fluid passage.

61. The rotary pressure swing adsorption distributor valve according to claim 60 additionally comprising rotary drive means operable to rotate the rotor face and stator housing face relative to each other.

62. The rotary pressure swing adsorption distributor valve according to claim 61 wherein the rotary drive means is operable to vary the speed of relative rotation between the rotor face and stator housing face.

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63. The rotary pressure swing adsorption distributor valve according to claim 61 additionally comprising loading means operable to exert a sealing force on the rotary valve, which urges the stator housing face and the rotor face towards each other to promote fluidly sealing contact between at least one of the rotor and stator housing faces and the first and second faces of the intermediate valve element respectively.
64. The rotary pressure swing adsorption distributor valve according to claim 61 wherein the intermediate valve comprises a stator secured to the stator housing face.
65. The rotary pressure swing adsorption distributor valve according to claim 61 wherein the intermediate valve element fluid ports are aligned with the fluid port openings in the stator housing face, and the intermediate valve element remains rotationally stationary relative to the stator housing face during relative rotation of the rotor face and stator housing face.
66. The rotary distributor valve according to claim 65 wherein the intermediate valve element is fixedly attached to the stator housing face.
67. The rotary pressure swing adsorption distributor valve according to claim 61 wherein the stator housing face, rotor face and first and second intermediate valve element faces are configured as surfaces of revolution.
68. The rotary pressure swing adsorption distributor valve according to claim 67 wherein the stator housing face, rotor face and first and second intermediate valve element faces are configured as discs.
69. The rotary pressure swing adsorption distributor valve according to claim 68, wherein the intermediate valve element is a plate.

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70. (Amended) A rotary distributor valve comprising:

a stator housing having a stator housing face, wherein the stator housing face comprises at least three fluid port openings, and a central axis of rotation;

a rotor having a rotor face, wherein the rotor face comprises at least two fluid port openings and a central axis of rotation disposed coaxially with the axis of rotation of the stator housing face;

an intermediate valve element having first and second faces, a central axis of rotation disposed coaxially with the axes of rotation of the stator housing and rotor faces, and a plurality of fluid ports extending between the first and second faces, which fluid ports are aligned with the fluid port openings in one of the stator housing face or the rotor face, wherein the first face of the intermediate valve element faces the rotor face and is in fluidly sealing contact with the rotor face, and the second face of the intermediate valve element faces the stator housing face and is in fluidly sealing contact with the stator housing face;

wherein the stator housing face and the rotor face are rotatable relative to each other about their common coaxial axis of rotation;

wherein the rotor additionally comprises at least one fluid passage connecting a first fluid port opening in the rotor face to a second fluid port opening in the rotor face;

wherein the valve is a rotary pressure swing adsorption distributor valve;

flow control means to control fluid flow within the at least one fluid passage;

rotary drive means operable to rotate the rotor face and stator housing face relative to each other; and

loading means operable to exert a sealing force on the rotary valve, which urges the stator housing face and the rotor face towards each other to promote fluidly sealing contact between at least one of the rotor and stator housing faces and the first and second faces of the intermediate valve element respectively;

wherein the loading means comprises distributed gas pressure loading means, the stator housing face and rotor face each comprise at least six fluid port openings, the intermediate valve element comprises at least six fluid ports, and the rotary drive means comprises an electric rotary drive motor.

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71. The rotary pressure swing adsorption distributor valve according to claim 70 wherein the electric rotary drive motor is a variable speed electric rotary drive motor.

72. The rotary pressure swing adsorption distributor valve according to claim 71, wherein the stator housing face and rotor face comprise metal materials, and the intermediate valve element comprises at least one polymeric material.

73. The rotary pressure swing adsorption distributor valve according to claim 72 wherein the intermediate valve element comprises at least one carbon material.